Soil Conservation

November 1978

U.S. Department of Agriculture

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From the Administrator

A Guide to Saving the Great Lakes

This summer in Canada, the Great Lakes Pollution from Land Use Activities Reference Group (PLUARG) presented its final report to the International Joint Commission (IJC) (see page 23). Norman A. Berg, SCS Associate Administrator, was PLUARG's U.S. chairman and Murray G. Johnson of the Ontario Region Fisheries and Marine Service headed the team for Canada.

The report was the result of almost 6 years of work. The findings and recommendations were based on the most up-to-date and comprehensive assessment of the relationships between land use and water quality. Pilot watersheds throughout the Great Lakes Basin were carefully monitored in both the U.S. and Canadian river basins.

Water quality problems in the Great Lakes Basin are similar to water quality problems in many parts of the Nation. PLUARG gives us a guide to improving water quality in the most cost effective and acceptable manner. A few of the important findings are:

- The Great Lakes are being polluted, from some land uses, by runoff of phosphorus; sediments; and some industrial organic compounds, previously used pesticides, and heavy metals. Lakes Erie and Ontario are most affected.
- Most nonpoint source pollutants that reach the Great Lakes are attached to soil particles from sheet and rill erosion. About 80 percent of this pollution comes from less than 20 percent of the land.
- Most of the nonpoint pollution comes from cropland. However, it is not the land use itself that affects water quality, but rather how the land is managed.
- It will not be necessary to do "everything everywhere" to improve Great Lakes water quality. We can focus our technical assistance, education and information programs, and dollars on the most important "hydrologically active areas" or on key lands within those areas that contribute the most pollutants to the lakes. These are primarily row-cropped areas on fine-textured soils, near streams and rivers.

The framework within which SCS can assist in improving water quality in the Great Lakes is already in place. It includes soils information provided through the National Cooperative Soil Survey and other resource planning data; Section 208 planning and implementation, including cost sharing under the Rural Clean Water Program; conservation districts, which have demonstrated throughout the country their readiness to take on water quality leadership; and assistance available from other USDA agencies.

The PLUARG report is only a guide. After the IJC holds public hearings, it will make recommendations to the United States and Canadian Governments. Then, action by local, State, and both national governments—with strong public support—will be needed to reduce the amount of sediment and other pollutants that reach the Great Lakes in runoff. SCS can help in the effort by continuing and strengthening its assistance to landowners and land users in reducing nonpoint pollution.

Mel Davis

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Bob Bergland
Secretary of Agriculture

Mel Davis, Administrator
Soil Conservation Service

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Cover:
One of the reasons the National Wetland Inventory got its start was for the migratory bird wetland acquisition program. The inventory will have many other uses. See article beginning on page 17. (From a photo by Donald C. Schuhart.)

Nature Study on Top of Green Mountain

by George D. Fears
and Sammy K. Harris

A nature study center in Alabama has a lot to offer: a soils display, a geology exhibit, wildlife study areas, historic attractions, and 2 miles of trails.

What better place to have an outdoor classroom than in an area surrounded by nature? Even the benches and lectern are made of natural materials.

The nature center offers members of the Town and Country Garden Club an ideal setting in which to hold their business meetings.

On the Cumberland plateau where the Appalachian Mountains reach into northern Alabama, lies the 72-acre Green Mountain Nature Study Center. At the center, Madison County, Ala., residents and visitors can study plants and wildlife in their natural habitat.

"In 1970, a group of citizens asked the Madison County Commission for assistance in planning a park on top of Green Mountain," said James Record, commission chairman. "The commission members were enthusiastic about the idea. We knew that with local support we could develop a fine recreation and nature study facility.

"From the beginning, the project was a cooperative effort of the Madison County Commission, citizen groups, and government agencies. Thanks to many dedicated people, the nature center is now a reality."

The center is located in a forested area about 12 miles from Huntsville, more than 1,300 feet above sea level.

"The nature center is different from a park," explained Tony Wilmer, the center's administrator. "It has no facilities for overnight camping, cookouts, or organized sports. We specialize in providing the public, especially children, with an opportunity to learn about nature."

Visitors arriving at the center sign a register at the rustic Orientation Pavilion. Brochures, prepared by the Madison County Commission, are available in the pavilion to explain the trails, wildlife study areas, and other facilities.

Inside the pavilion, various agencies have nature study exhibits.

A display prepared by the Alabama Forestry Commission includes a tree leaf identification chart and a stump from an old oak tree with an explanation about how to determine the tree's age, its years of good and bad growth, and how the annual growth rings are formed.

The Madison County Soil and Water Conservation District (SWCD) gave the center a display of soils occurring in the county. SWCD and Soil Conservation Service personnel use the soils display when they give interpretive lectures about the soils and their uses.

Other exhibits in the pavilion include a geological profile showing how native sandstone, shale, and limestone were formed; pictures and identification charts of wildflowers and songbirds; and wood carvings of local birds.

One of the highlights of the nature study center is 2 miles of trails. SCS and the Alabama Forestry Commission assisted the Madison County Commission in laying out the trails and clearing underbrush. The trails were designed to follow the contour of the land as much as possible to prevent erosion. Wood chips cover the trails.

Study areas along the trails include specimens of Alabama's native plants. Trees such as oak, hickory, pine, eastern redcedar, and chittamwood are identified by their common and scientific names. Native wildflowers such as ladyslipper and bluebell are also identified.

Recently, a 1,500-foot Braille Trail was added to the nature center. The trail is equipped with rope hand guides and information markers written in braille.

Although the center is only a few miles from Redstone Arsenal, home of the Saturn V rocket that put men on the moon, visitors to the center can step back into the past as they visit an old-fashioned springhouse, an authentic whiskey still, a reconstructed log cabin, or a covered bridge. Plaques show the original locations of the structures and give the history of the areas where they had stood.

The center was developed around a 16-acre, manmade lake formed in a natural basin by an earthen dam designed to hold water from the area's springs. SCS provided technical assistance in selecting the location for the lake and in designing the dam. Although fishing isn't permitted, the lake is stocked by the Alabama Department of Conservation and Natural Resources with bass and bream.

There are two outdoor classrooms at the center, each having log benches and a wooden lectern. The outdoor classrooms are available to the public and some teachers from Madison County schools use them regularly. Biology teachers bring their classes to the center to augment classroom teaching. Students have the opportunity to identify wildlife and plant habitat and study how plant and animal life varies from the marsh area around the lake up to the mountain ridge.

Wildlife food plots and habitat have been established throughout the center. Some of the wildlife that inhabit the area are rabbits, squirrels, beavers, muskrats, opossums, and raccoons as well as many native birds—mockingbirds, robins, sparrows, chickadees, cardinals, and woodpeckers. Wood duck nesting boxes have been placed around the lake and an observation shelter is available for viewing wildlife in its natural environment.

The Green Mountain Nature Study Center is open from dawn to dusk, 7 days a week. It offers a variety of learning experiences in history, biology, geology, ecology, and nature appreciation.

Mr. Fears was a soil conservationist, SCS, Huntsville, Ala., and has resigned.
Mr. Harris is district conservationist, SCS, Huntsville, Ala.

Hand-planting was the order of the day in the early 1940's when pine trees were used to stop severe wind erosion.

In 1944, Hugh Hammond Bennett, first chief of SCS, inspected the erosion in western Michigan. His left hand shows the original soil level.

Yesterday's Trees, Today's Jobs

by Roger Howell

Trees planted 30 to 40 years ago to control wind erosion are providing people in Michigan with jobs and income today.

Work crews today thin the 40-year-old stands. Scattered clear cut areas are protected from wind erosion by the surrounding trees and will be replanted.

In the 1930's during the Nation's worst economic depression, farmers in Ottawa County, Mich., were struggling to earn a living and keep their soil in place. Severe wind erosion of the sandy soil along Lake Michigan was blowing fields and farms away. Drifting sand was burying roads and fences.

By 1938, programs were operating to solve the economic problems and erosion. Civilian Conservation Corps (CCC) camps were established throughout the Nation to provide jobs and stimulate the economy and the Soil Conservation Service had been established in 1935 to combat soil erosion.

In western Ottawa County, where wind erosion was the most severe, farmers took advantage of Michigan's new law that allowed local landowners to organize soil conservation districts. The West Ottawa Soil Conservation District (SCD) was the first district organized in Michigan. Through the new conservation district, SCS and the Grand Haven CCC camp helped farmers hold down their land.

But, for some, the West Ottawa SCD came too late. Because of delinquent taxes, the State had acquired 1,436 acres of land from farmers in the county. Some farmers had decided to try elsewhere and had sold their land to the only purchaser available, the Federal Government.

In 1940, ownership of the land acquired by the State was transferred to Ottawa County and the county leased it to the West Ottawa SCD. In 1942, the Federal Government

One tree can only do so much. Before the wind erosion of the 1930's, the ground line was even with the mound protected by the tree.

purchased 6,200 acres in the county. The SCD annual report for that year described the tract as "blow areas devoid of vegetation and a menace to neighboring areas." In 1943, the newly purchased Federal land was also leased to the district for management.

The West Ottawa SCD led the way in showing area landowners what to do about wind erosion and how to do it. The SCD established its own tree nursery, planted trees on the land it leased, and organized tree planting bees. Besides the trees the district grew in its nursery, it received trees from the State and SCS for the project. SCS also provided technical assistance. The Grand Haven CCC camp provided the labor for the many tree plantings.

In 1941, local citizen volunteers planted 45,000 trees in 1 day on Dewey Hill, an area in the county badly needing protection from erosion.

Also, following the district's example, farmers established their own nursery beds to grow the trees they needed. In 1943, they produced over a million pine seedlings, and by 1948, 59 4–H clubs and several schools had nursery beds. Today, Ottawa County has about 36,000 acres planted to red, white, Scotch, and jack pine trees. Red pine is the dominant species, making up about 50 percent of the stands. Jack pine has done well on poor sites and some pitch pine is growing although it is not common to the area.

The efforts of the West Ottawa SCD paid off. The tree plantings significantly reduced wind erosion in the county. The district had also set the stage for a future employment program that would show people how to manage their mature tree plantations.

The Comprehensive Employment and Training Act (CETA) of 1973 provides work for people who need jobs and work experience. In late 1976, when the Ottawa SCD (formerly the West Ottawa SCD) leaders were asked if they knew of a project that could provide work and training for CETA employees, their reply was, "We sure do."

The district still held the lease on more than 1,200 acres of county-owned land, and the trees they had planted earlier to stop erosion were now too thick and needed management.

In March 1977, the SCD hired Veronica Sullivan, a forester, through the CETA program to plan and supervise a woodland management project. Sullivan consulted with CETA officials, SCS, a local paper company, and foresters from the Michigan Department of Natural Resources.

She determined management methods to fit the needs of different forest areas based on the soils, the kinds of trees, and their growth rate. Selective cutting was done in some areas and some areas were clear cut and are being replanted with red pine. The scattered clear-cut areas are protected from wind erosion by the surrounding trees.

By mid-April, 34 people were working on thinning the 35- to 40-year-old pine plantations. The project was expanded and in July, 93 people were working on the project. By November, they had harvested 2,100 cords of pulpwood in thinning operations on 175 acres. Wood from the thinning operation was sold to a paper company in nearby Muskegon, Mich.

The paper company now considers Ottawa County and the surrounding area an untapped pulpwood resource and offers free management assistance to insure sustained local wood production. Private timber cutters are providing jobs for people trained through the woodland management project and Sullivan now has a job with USDA's Forest Service.

At the beginning of August 1978, improved cutting had been done on 510 acres and 55 people are still working on the project. Of the district's former CETA employees, 200 now have unsubsidized jobs.

The project has met its goals of providing jobs and training to the unemployed. It also helped landowners, who had planted pine trees almost 40 years ago to control erosion, to see value in land they once considered useless.

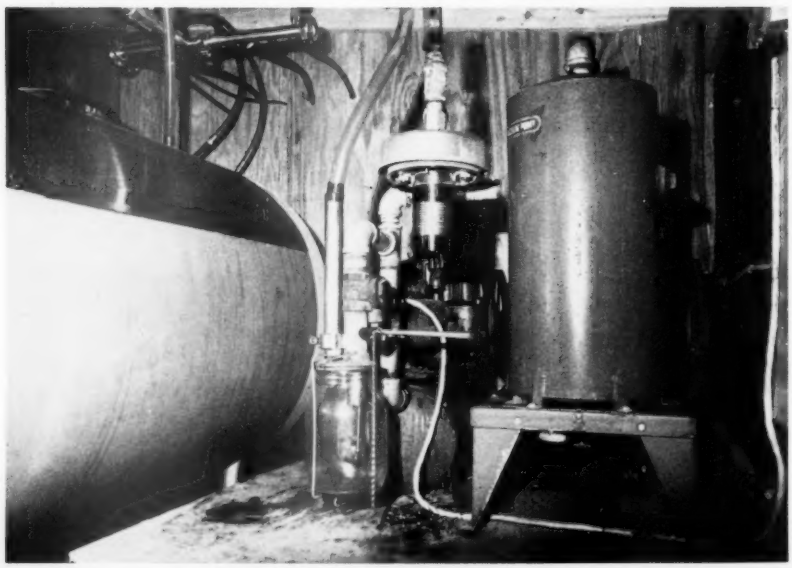
The woodland management project has shown that trees planted to control wind erosion also produce income when managed wisely.

Mr. Howell is public information officer, SCS, East Lansing, Mich.

Sugar Maples Milked as if They Were Cows

An innovative Virginia farmer discovers that milking machines are not just for cows.

Aerial lines of plastic tubing, strung from tree to tree, feed sap into a processing shed.



What used to work for cows works just as well for trees. A converted milking machine creates a 15-pound vacuum to keep the sap flowing.

by Helen S. Jeter

The Puffenbarger farm covers 84 acres in northwestern Highland County near Blue Grass, Va. The farm's primary enterprises are beef cattle and sheep. However, a 33-acre sugar maple orchard adds sweet income.

Maple syrup products offer many opportunities for expanding farm incomes, particularly for innovative operators willing to explore new techniques. Ivan Puffenbarger has done just that. He now milks his 850 sugar maple trees with an old milking machine.

Ivan Puffenbarger became a cooperator with the Mountain Soil and Water Conservation District in 1960. When Puffenbarger's conservation plan was developed, the Soil Conservation Service forester recommended that Puffenbarger thin the maple orchard. Since sap from the sugar maples has a much higher sugar content than sap from red maples, the forester advised him to remove the red maples and create more room for the sugar maples. This would allow the sugar maples to grow larger tops which provide more sugar water for more syrup resulting in increased income.

In 1964, Puffenbarger stopped collecting maple sap in buckets and installed plastic tubing to collect the sap and transport it to his processing shed. This method offers a neat solution to the problems of collecting sap from trees on the steep slopes of Highland County which are often covered with ice and snow.

Originally, the tubing installed on the Puffenbarger farm was laid on the ground. Today, it is carefully hung in an aerial system. The secret to the success of using tubing is for the sap to flow freely to a collection point. To assure free flow, Puffenbarger uses an old milking machine with a 15-pound vacuum that increases the sap's flow to three times the natural flow.

This was not the end of Puffenbarger's new techniques. He installed one of the first automatic, oil-fired evaporators in Virginia. Since he is interested in fuel conservation, he delights in describing the efficient operation of his automatic evaporator. It contains copper coils to carry off steam created by the boiling sugar water. The coils are so arranged that they contribute additional heat.

The longer sugar water boils, the sweeter and thicker it gets. "It takes an average of 2 hours of boiling sugar water in the evaporator before the first syrup can be drawn off," Puffenbarger explained. "But once it starts, you can draw off syrup every 5 minutes. The thickening of the colorless sugar water causes it to move through the evaporator until a gage indicates draw off time. The automatic operation of the evaporator prevents overcooking, wasted time, and wasted fuel."

Oldtimers in the maple sugar business say hard winters make better syrup. Puffenbarger is inclined to agree. The winter of 1976-77 was the most severe on record in Virginia for many years.

"It normally takes 40 gallons of sugar water to produce 1 gallon of maple syrup; but in the winter of 1976-77 only 30 gallons of sugar water were needed to make a gallon of maple syrup," said Leslie Moyers, soil conservation technician at Monterey.

"Even though the winter of 1977-78 had many days of extremely cold temperatures, it just ended too soon," he continued. "So last winter it took 40 to 45 gallons of sugar water to make a gallon of maple syrup."

The maple sugar season is short but very busy for the Puffenbarger family. Ivan oversees the boiling sap; his mother, wife, and daughter create maple sugar products in the kitchen; and his brother Roy handles sales.

As part of his woodland management plan, Ivan harvests trees too old to produce sugar water and sells them for lumber.

Ivan Puffenbarger is a dedicated district cooperator and works closely with personnel from SCS and the Extension Division of Virginia Polytechnic Institute and State University. Working together as a team, they have offered several 1-day training sessions for sugar maple farmers who are interested in seeing sugar maple trees milked like cows.

Ms. Jeter is public information officer, SCS, Richmond, Va.

Working on the Woods

by Jack Busfield
and Jerry N. Fox

Landowners in West Virginia let the sun shine in on their woodlands and grew jobs along with the trees.

One natural resource that there is no shortage of in central West Virginia is trees. Some counties are more than 90 percent forested. The Elk Soil Conservation District (SCD) recognized a need for timber stand improvement in the area and developed a program to help landowners in Braxton, Clay, Nicholas, and Webster Counties.

The timber stand improvement (TSI) program involved thinning tree stands so that remaining trees would grow faster and produce more high-quality timber. In the four-county project, more than 200,000 trees were cut and hundreds were deadened to make more sunlight, moisture, and soil nutrients available to the remaining trees. The TSI made room for rapid growth of yellow poplar, sugar maple, black walnut, and red oak.

SCS District Conservationist Jerry Fox (right), Sewell Priest of the Agricultural Stabilization and Conservation Service, and Robert Whipkey (left) of the State DNR inspect one of the trees selected to be left after a timber stand was thinned.

In addition to helping landowners improve their timberland, the Elk SCD wanted to give jobs to local people to help reduce the high unemployment rate of about 22 percent.

Under Title X of the Job Opportunities Act (Public Law 93-567), the U.S. Department of Commerce granted the Elk SCD $19,100. The grant was used for 25 percent of the cost of thinning the woods.

The district also obtained 75 percent funding from the Forestry Incentives Program administered by USDA's Agricultural Stabilization and Conservation Service which cost shares various programs to get conservation practices on the land.

The district called on other agencies for assistance. The Soil Conservation Service made the initial contacts with landowners to explain the program and coordinated work done by the district crews.

The State Department of Natural Resources (DNR) evaluated sites, determined prospects for future tree growth, marked the trees to be cut or deadened, and certified that the crews had done the work. The DNR hired six forestry aides with its funds to help local foresters mark the trees to be cut.

The West Virginia University Center for Extension and Continuing Education helped the agencies carry out public information programs to encourage landowners to participate. The cooperating agencies prepared an exhibit on the work and presented it at the 1976 Mountain State Forest Festival at Elkins.

Under the TSI program, 93 landowners had their timber stands improved on 2,081 acres. The smallest parcel of land was 5 acres and the largest was 200 acres. Throughout the program, the district hired a total of 17 people. The district paid for about 10,000 hours of work at a cost of about $51,400.

Some landowners used the felled trees for firewood and other purposes on their own lands. Others left the felled trees on the ground to decay and enrich the soil.

In 30 to 50 years, the work will benefit not only the property owners, but wood processors and consumers as well. Robert Whipkey, a DNR forester, estimated the TSI in the Elk SCD will result in production of 200 to 250 additional board feet of high-quality lumber per acre per year.

As a result of the TSI program, landowners who were not involved in the program have become interested and have asked SCS for help in improving their timber stands.

Mr. Busfield is chairman, Elk Soil Conservation District, Gassaway, W. Va.
Mr. Fox is district conservationist, SCS, Gassaway, W. Va.

Nudging Nature

Little willows do a big job on the banks of Holmes Run.

by Stuart Finley

Teams of conservationists poke and plant in an effort to hold the streambank. The first person pokes a hole and the second plants the rooted cutting. The plant chosen for the site is blue arctic willow, a species that prospers in dense shade.

A band of concerned conservationists sloshed through the chilly waters of Holmes Run in Fairfax County, Va., in late March this year, digging small holes in the eroding streambanks and planting rooted cuttings of willow and dogwood.

The project was part of the Northern Virginia Soil and Water Conservation District's (SWCD) Vegetative Streambank Stabilization Program.

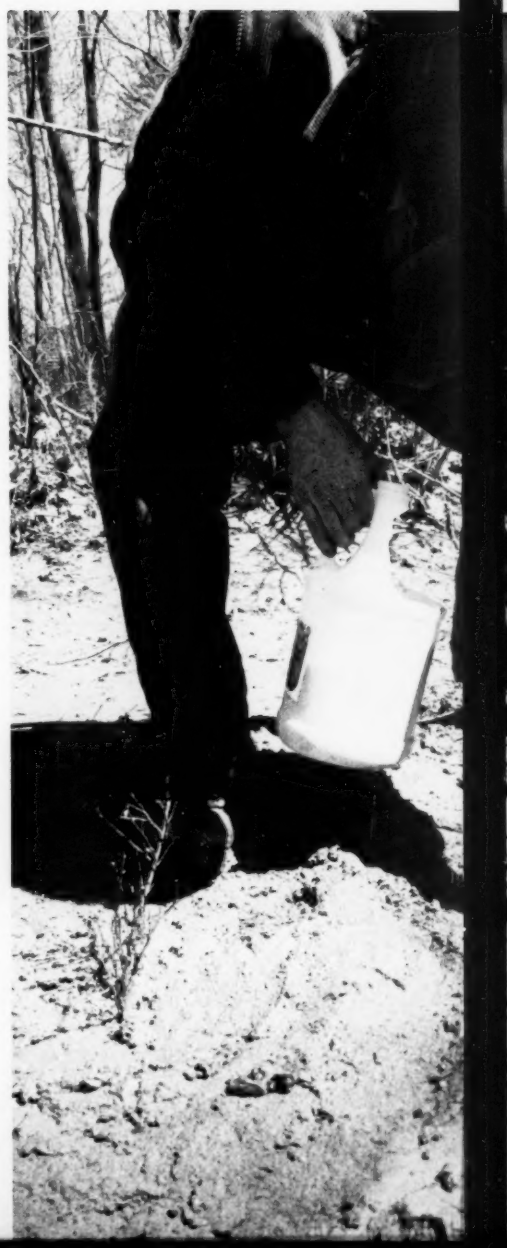
Under the program, the Northern Virginia SWCD planned a demonstration planting along parts of Holmes Run that were suffering erosion but were not yet severely damaged.

In planning, the directors discussed the project with Soil Conservation Service personnel including Plant Materials Specialist Curtis Sharp and District Conservationist Puller Hughes. Fairfax County cooperated in the effort and assigned its engineering consulting firm to select suitable sites for the revegetation work.

"Although streams are dynamic, ever-changing environments, many streams unaffected by man remain stable," Sharp said. "Plants on such streams are well adapted to the existing conditions. But, as we alter the watershed, existing conditions change, runoff is often increased, and erosion may follow. New vegetation may restabilize the streambanks naturally, but it is usually a slow process. A new set of plants must adapt to a new set of conditions.

"Planting adapted species on potential or existing erosion sites can help accelerate natural stabilization. The plantings on Holmes Run are an attempt to control erosion before it gets worse."

The district is concerned about streambank erosion throughout Fairfax County, but especially in the



A dibble bar makes planting easier, especially in hard-to-reach spots.

After planting, a slow release fertilizer is spread around the plant and tromped on.

eastern part which was widely urbanized about 25 years ago. The district's long-range plans include rehabilitating streams there, some of which have cut back into the earth so badly that they have had to be channeled into paved ditches by concrete, riprap, or gabion baskets. Sections of other streams in the area are gradually deteriorating.

"In stabilizing streambanks," Sharp explained, "plants should be used which are well adapted to the stream and site conditions. Frequently, grasses such as tall fescue can be used alone if the stream is small and a good seedbed for planting can be prepared. But, as the size of the stream increases, the size and type of the plants to be used also change. Small shrubs such as dwarf willow or silky dogwood are ideal where the stream velocity is moderate."

Eroding streambanks are often in backyards or in parkland with a dense tree overcover. For the Holmes Run project, the Northern Virginia SWCD needed to find plant species that would prosper in dense shade.

The district, assisted by SCS, decided on two commercially available plants—blue arctic willow (Salix purpurea nana) and silky dogwood (Cornus amomum). The plants arrived in big bundles and, to the surprise of some of the participants in the project, Bill Sheads of the Virginia Division of Forestry chopped off excess tops and roots of the plants with an ax.

Sheads then explained to the group the use of the dibble bar in planting. A dibble bar is a heavy metal tool with a blade and foot pedal. It is thrust into the ground to make a hole for the plant. Then the plant roots must be maneuvered into the bottom of the hole so they will grow down instead of up. Also, the roots should

The cuttings barely had time to sprout before they were tested. As small as they were, they managed to hang on and catch debris during a heavy rainfall.

not be twisted. The dibble bar should be reinserted a few inches away from the plant to close the hole. Slow release granular fertilizer is applied on the surface—not in the hole.

It takes two persons to plant one of the rooted cuttings this way. One dibbles; the other dabbles with the seedling and the fertilizer. Plants were spaced about a foot apart at the bottom, in the middle, and at the top of the bank along Holmes Run.

"For shady sites on small streams," Sharp said, "evergreen ground covers, such as lily turf or Hall's honeysuckle, are good. Tall and red fescue can be seeded on the same sites. Dwarf or medium-sized bamboo are shade tolerant and reduce erosion, although their value for this purpose has not been widely evaluated. Sites that are partially or completely in the sun can be planted with a wider variety of material.

"In addition to the plants mentioned above, deep-rooted, long-lived legumes such as flatpea or crownvetch can be added to the grass mixture," he continued. "On larger streams, 'Streamco' purpleosier willow, recently released by the SCS plant materials center in Big Flats, N.Y., has been widely used with good results. A native river alder, which occurs throughout the northeast, shows great promise although it has not been fully tested."

Vegetative streambank erosion control is less expensive and elaborate than concrete walls, paved ditches, and other structures. "A program of identifying potential or existing erosion sites, followed by selective plantings, will cost only a fraction of any engineering solution which may be needed if erosion along streambanks is allowed to continue," said Sharp. "Of course, vegetation cannot be effective in all locations and may not always be successfully established where it is adapted. But if revegetation is done properly, it can reduce expensive problems in the future."

Northern Virginia SWCD District Executive Mark Decot, a forester, emphasized the need to monitor the plantings along Holmes Run, particularly after storm events, to evaluate their effectiveness.

"Half of the worth of the Holmes Run project is simply the fact that we're trying," said Bob Keating, chairman of the Northern Virginia SWCD. "All of the people who came out to help with the planting went home happy—though aching—and better informed than when they arrived."

Mr. Finley is a director, Northern Virginia Soil and Water Conservation District, Fairfax, Va.

Even the little waterways leading into Holmes Run were sprigged with willows. Here, the survival probability is high because of lack of high velocity flood flows during storms.

Knowing and Growing Trees

by Gene Warren

Timber management is a long-term investment that takes careful planning and knowledge about such practices as thinning, fire protection, and harvesting.

Fred Loe talks plainly when it comes to trees. "Fact is, it just doesn't make a lot of economic sense to grow trees for market on a short-term basis on land that would sell for $500 to $1,000 an acre, and most land up here in north Louisiana is going for that," said Loe.

"But there's a lot more to growing trees than shipping them off to the mill," he added. "They are beautiful, provide homes for wildlife, and over a long period of time they will make a pretty good return on your investment."

Loe knows what he is talking about. He was selected by the Louisiana Forestry Association as Louisiana's Outstanding Tree Farmer in 1977. He is also a long-time cooperator with the Saline Soil and Water Conservation District.

Loe manages about 835 acres of family woods in Bienville Parish. About 80 percent of the woods is in plantations. Years ago, trees were planted in old cotton fields.

"I think the biggest thing we have done here is upgrade our woods," Loe said. "We started out about 20 years ago with some old worn-out fields and a hundred acres or so of badly cutover pines and hardwoods. We have planted, taken out the cull trees, thinned some thick stands, and protected the area from wildfires."

Loe makes a distinction between wildfires and controlled fires. "We use fire as a management tool," he explained. "When properly used, fire can be effective in making the forest floor a better place for tree seedlings and wildlife food plants to germinate.

"Also, since wildfires usually occur when debris on the forest floor has built up," he continued, "controlled fires can reduce the chances of wildfires by reducing the amount of debris."

About 650 acres of Loe's timber was harvested and thinned in 1977. The older stands yielded more than 1,000 board feet of logs per acre plus some pulp. The way Loe figures it, the next harvest, in 4 to 6 years, will average 1,000 board feet per acre on all the land and in about 15 years, the woods will yield more than 2,000 board feet of logs per acre each harvest.

"I tell people that you have to figure trees over a long period of time," Loe said. "Most folks don't have that much time, but in our case we don't depend solely on income from the trees for a living, so we can wait it out.

"I'm not saying that we couldn't sell our land, invest the money, and let it draw more interest than the woods are making," he continued. "Maybe that's a fact, but there is a thrill to me and the rest of the family in owning and managing timber."

About 10 years ago, Loe asked Don Parkman, Soil Conservation Service district conservationist, to teach him about timber management. One management practice he learned from Parkman was the D+6 method of thinning.

"The D+6 method means using the average diameter in inches of trees in a stand, converting the inches into feet, and adding 6 feet to determine the distance apart the trees should be," Loe said. This allows plenty of crown space."

Fred Loe discusses his timber management plan with District Conservationist Don Parkman.

Loe admits that his cutting plans are sometimes altered by the current price of timber. "I study the market closely," he said, "so when the time is right, we can make a harvest."

All marking of Loe's timber is done by members of the family or by a trusted firm. "Selecting what trees to cut is important to the stand's future quality," Loe explained. "As I said, upgrading is a big factor in increasing the value of a stand of trees."

Loe has his roads well planned and knows just about every inch of the woods. He explains, "Tree growers have to know their trees just as dairy farmers have to know their cows."

Mr. Warren is public information officer, SCS, Alexandria, La.

Second Generation Conservationist

by Nancy M. Garlitz

Since he took over his father's farm in the hills of eastern Tennessee in 1957, David Garland has worked to conserve the natural resources on his 406-acre dairy farm and throughout Washington County.

His father was one of Washington County Soil Conservation District's (SCD) first cooperators. Garland too went to the SCD for help in conservation planning. He received technical assistance from the Soil Conservation Service.

Contour stripcropping, conservation tillage, crop rotations, sod waterways, pasture renovation, and planting trees on steep areas have helped Garland protect his land and increase production.

"My conservation program has helped me almost triple the farm's milk production," Garland said.

Garland usually has 120 to 135 cows producing milk at any one time. His total herd numbers 250. Rotating his crops enables him to produce most of the grain and forage his livestock needs.

All of Garland's crops are grown in strips on the contour. He uses a double cropping system on some fields in which he grows rye and wheat for silage, chisels and disks the field lightly, and then plants corn for silage or grain. Crop residues left on the surface protect the soil from erosion. Chisel plowing opens the soil and allows water to soak in, which also reduces erosion.

Garland uses conservation tillage on fields of corn and timothy. "Many other farmers in the county use conservation tillage on some or all of their crops," Garland said. "We're trying to save energy and soil."

Garland also rotates row crops with orchardgrass to reduce erosion on his sloping land and improve soil tilth and fertility.

As part of pasture renovation on his farm, Garland limes and fertilizes his fields according to soil tests. He mows the first crop for hay and his cattle graze the second crop. To reestablish clover in pastures of fescue sod, he overseeds with clover in early February. Garland mixes the clover seed with fertilizer and broadcasts it on his pastures. Grazing early reduces competition from the fescue and allows the seedling clover to get a good start. That way he doesn't disturb the soil by preparing a seedbed.

Besides working to reduce erosion, Garland is protecting water quality on his farm and further downstream in other ways. All natural drainageways on his farm are sodded with fescue. The grassed waterways safely carry runoff from his fields and filter out sediment and other pollutants.

Garland has a waste management system for his milking parlor and feedlot. A primary lagoon catches manure and wash water from the milking parlor and a secondary pond catches any overflow from the primary lagoon. The waste breaks down biologically in the lagoon and evaporates.

Garland spreads the manure he scrapes from his concrete feedlot onto his fields and the lagoon catches any runoff from the feedlot. When conditions aren't right for hauling the manure onto the fields, he puts it into the lagoon. When the lagoon fills up, he pumps out the waste and spreads it on the fields.

David Garland (right) and Jim Eldridge, SCS district conservationist, examine freshly cut orchardgrass and clover which will be used for hay. Garland will let his cattle graze the regrowth.

On slopes too steep to maintain in adequate pasture and control erosion, Garland has planted loblolly and white pine trees. Hardwood forests on his farm attract squirrels, foxes, raccoons, and opossums.

Garland has five ponds on his farm and he stocks them with bass, bluegill, and channel catfish. Besides providing recreation for his family and friends, the ponds also provide habitat for wood ducks.

Garland is serving his second year as chairman of the Washington County SCD board. He was appointed as a member of the board in 1962. He said he sees his job as chairman of the SCD board to be trying to help the county progress in its conservation efforts.

Ms. Garlitz is assistant editor, *Soil Conservation*, SCS, Washington, D.C.

If birds could read, they would be among the prime users of the inventory that tells . . .

Where the Wetlands Are

by Anne Schuhart

A farmer stops his tractor at the end of a row—time for just one more pass across the field before supper. He glances at the sky, looks again, and grins. "It's spring all right. Here come the ducks," he says to himself. He switches off the engine to hear the wingbeats and soft quacking as a flock of mallards passes directly overhead. His eyes follow the birds as they set their wings and land in a marsh at the other end of the field.

The marsh is small—just a few acres—but it's a problem, he thinks. If he drained it, he could make a continuous sweep with his equipment instead of always having to work around it. The soil's bound to be fertile there. It would give him a good yield.

But where would the ducks go? Most of his neighbors have drained their marshes. There are marshes to the south and a large reservoir farther north, but do the ducks need his marsh as a stopover during migration?

The chairman of a zoning board leans over a map of his county. He traces the river north from the county seat to the spot where a large corporation wants to build a new plant. He chews his pipestem. Should he recommend that the county grant a development permit for the site?

The company has assured the county that it will maintain strict pollution control standards, and it will create several hundred badly needed jobs. But something still worries the zoning board chairman.

Building near the river means draining some wetlands. He knows that certain wetlands act as blotters to absorb stormwater and help control flooding. Would flooding become a problem if the company's site were drained? Or would other wetlands in the watershed handle the stormwater? A lot of people live along the river in the older part of town . . .

When a decision involving wetlands needs to be made, there often are many more questions than answers. There simply is little available current information about wetlands.

The National Wetland Inventory now underway is changing that. The inventory, which is being conducted by the U.S. Department of the Interior's Fish and Wildlife Service (FWS), will identify and map the wetlands of the United States and its territories. It is based on a new classification system that will provide data for a wide range of users, including wildlife managers, hydrologists, land-use planners, economists, engineers, and public and private agencies and organizations.

"I see this inventory as a balancing tool to help people make better decisions about the use and management of wetlands," said John H. Montanari, project leader for the inventory staff.

FWS initiated the inventory to supply information for processing permit applications for the use of wetlands and in managing its migratory bird wetland acquisition program. The inventory will delineate wetlands on a broad scale for analyzing migratory birds' breeding and wintering habitats. It also will provide data for environmental impact statements and data that can be used by many other Federal agencies.

The inventory will help State governments in planning and implementing coastal zone management programs and surface mine regulations, for example. It will help local

For the wetland inventory, unlike soil surveys, most of the mapping is done by photo interpretation instead of on the land. Areas of wetland are marked on aerial photographs. Cartographers (above) use a zoom transferscope to transfer information from the photos to maps.

Above, Blake Parker, SCS liaison (left), and John Montanari, project leader, discuss an interpretation on one of the maps.

Left, the inventory can be kept current with a new computer system, which will eventually replace most manual work.

governments and individuals in land-use planning. And it will help conservation organizations identify valuable wildlife habitat for preservation.

The last national wetland inventory was made in 1954 to assess the amount and types of waterfowl habitat in the 48 contiguous States. Since then, many wetlands have been drained, filled, or changed in other ways.

The new inventory will take these changes into account. It also will be more comprehensive, including wetlands smaller than 5 acres while the old inventory took in only those larger than 40 acres.

"We're trying to draw a line around every marsh and swamp in the country," Montanari said. "We will put the information onto a series of maps at a scale of 1:100,000. To cover the State of Florida, for example, we're talking about 46 maps at that scale.

"In addition, we will map wetlands in specific areas at a scale of 1:24,000. These will be areas where there is a high density of wetlands, such as the Mississippi River Delta or prairie pothole region. We also will make the larger scale maps in sensitive areas where wetlands are coming under pressure because of population, economic, industrial, or agricultural growth. Examples are coastal zones near metropolitan centers or surface mining areas in the West where there are fewer wetlands and the wetlands that do exist are very valuable."

The inventory information also will be put into a data bank. "The computer will group wetlands by State, county, watershed, size, physiographic region, ecoregion, and classification," Montanari explained.

"The readout for a particular map sheet will list the State, county, ecoregion, landform, hydrologic unit, type of wetland, wetland acreage, number of units, and the number and percent of acres and units that are farmed and not farmed."

Reports for each State, FWS region, and for the entire country will summarize the inventory data by wetland type, political subdivision, ecoregion, landform, and watershed.

Work materials collected for the inventory—such as collateral data, aerial photographs, compilation maps, work sheets, and field reports—also will be available on a limited basis.

The inventory itself relies more on technology than fieldwork. Unlike soil surveys, for example, most of the mapping is done by photo interpretation instead of on the land.

At the inventory headquarters in St. Petersburg, Fla., FWS personnel mark areas of wetland on aerial photographs and topographic maps. The photos and maps are then sent to contractors for interpretation.

Photo interpreters-biologists trained at the inventory headquarters interpret the photos and provide FWS with the type of wetland delineated and the type of vegetation growing there. Regional coordinators for the inventory make sample field checks of the interpretations to insure that the work complies with FWS standards.

Cartographers, also trained at the inventory headquarters, then use a zoom transferscope to transfer the information from the photos to maps. This minimizes distortion.

A new computer system, the Wetlands Analytical Mapping System III (WAMS III), eventually will replace most of the manual work. It does everything from drawing boundaries around wetlands to printing out maps.

With the WAMS III, the inventory can be kept current. The system can produce maps at any scale, freeing the inventory from a static base map. It also allows information to be added and updated continually.

"The National Wetland Inventory project was started in 1974," Montanari said, "but we found that before we could get to work, we needed some basic tools.

"We didn't know what States had done in the way of wetland inventories in recent years, so we put together an expanded bibliography. It's really a reference work of inventories conducted by Federal, State, and local governments and private organizations since 1965, complete with index maps.

"We also had to find out what areas were covered by aerial photographs that would meet our needs, and we published an atlas of recent high-altitude aerial photography."

The new wetlands classification system is the most significant of the tools developed for the inventory. The new system is hierarchical. It first classifies wetlands in broad categories according to their origin: marine, estuarine, riverine, lacustrine, or palustrine. It then defines wetlands

in several increasingly specific groups. The wetland inventory, however, only classifies wetlands according to the first three levels of the new system.

One key to the success of the classification system and the entire inventory is the cooperation among government agencies. "Other agencies, such as the Soil Conservation Service, the Army Corps of Engineers, and the U.S. Geological Survey, have contributed expertise we don't have and views we never thought about. Also, other agencies are more likely to use the inventory since we incorporated their input," Montanari said.

SCS, for example, has been involved in the inventory from the beginning. SCS personnel helped develop the classification system, particularly in determining relationships between kinds of soil and types of wetlands and wetland vegetation. They also helped test the system for ecological soundness at 22 sites around the country.

William B. "Blake" Parker, former assistant State soil scientist for Mississippi, represents SCS as a full-time member of the inventory staff at St. Petersburg. Parker interprets for the inventory soils data and other information already gathered by SCS in river basin studies, watershed plans, and soil surveys.

In turn, the inventory will supply SCS personnel with information they can use in making future soil surveys, river basin studies, watershed plans, and even in conservation planning with individual cooperators.

The operational phase of the National Wetland Inventory began in the fall of 1977. In just the first 28 days, 32 maps were completed and 13,792 wetlands were located and classified. Of these, 832 were larger than 40 acres; 6,592 were between 5 and 40 acres; and 6,368 were smaller than 5 acres.

"During 1978, we will have mapped most of the gulf and west coasts and a good chunk of the east coast," said Montanari. Mapping of most of the country is due to be completed by the end of fiscal year 1981.

Ms. Schuhart is a writer-editor, Information Division, SCS, Washington, D.C.

Above, data provided by the inventory will be useful in analyzing migratory birds' breeding and wintering habits.

Conservation organizations can turn to the inventory for help in identifying valuable wildlife habitat for preservation.

New Publications

Your Role in Conservation's Future

by the Soil Conservation Service

Because of the Soil and Water Resources Conservation Act of 1977, the public will have a voice in long-range planning decisions that will guide the future of the U.S. Department of Agriculture's conservation programs. "Your Role in Conservation's Future" explains the new law and how the public can participate in helping SCS and conservation districts develop a responsive conservation program.

The pamphlet explains the appraisal called for by the act and the national soil and water conservation program which is to be based on the appraisal. The appraisal and program are to be completed by the end of 1979 and updated every 5 years.

The publication also explains the evaluation of the national soil and water conservation program which SCS will prepare annually. A schedule of formal opportunities for public participation is given along with information about how to contact local conservation districts or SCS offices.

Single copies are available from local conservation district offices or from the Information Division, Soil Conservation Service, Room 0054–S, Washington, D.C. 20013.

The Idea That Worked: America's Conservation Districts

by the Soil Conservation Society of America

This educational cartoon booklet tells the story of soil and water conservation districts. It explains the role conservation districts play in halting erosion, improving watersheds, influencing the wise use of land resources, improving water quality, and expanding agricultural production.

The booklet is colorful and tells its story mainly through two district youth board members who help explain conservation districts to their city's business and professional club. It also shows how local government can help citizens protect the community's natural resources.

The booklet is the 11th in a series published by the Soil Conservation Society of America and written in cooperation with the National Association of Conservation Districts. The booklets are designed especially for teaching school children the wise use of natural resources. Teacher's guides are available to help teachers use the booklets in their classrooms.

Copies of "The Idea That Worked" are available from the Soil Conservation Society of America, 7515 Northeast Ankeny Road, Ankeny, Iowa 50021. Single copies are 35 cents. Teacher's guides are 25 cents. A complete set of all 11 booklets is available for $2. A set of teacher's guides is also $2. Prices differ for quantity orders.

Helping Wildlife: Working with Nature

by the Wildlife Management Institute

This booklet is directed at teachers and instructors in environmental and natural resources education. It is designed for use by youth groups, nature and recreation centers, libraries, hunter safety programs, and schools.

The booklet is a guide to teaching and learning basic ecological concepts of natural resources and wildlife habitat management. It defines and explains energy flow, food chains, the mineral cycle, influences of weather, habitat, ecological succession, wildlife population characteristics and dynamics, predation, and the role of the wildlife manager.

The text highlights key concepts, and illustrations include easy-to-read diagrams and charts. An annotated bibliography of books, newsletters, and magazines will help instructors and students locate additional information about wildlife management.

Copies are available from the Wildlife Management Institute, 1000 Vermont Avenue, N.W., 709 Wire Building, Washington, D.C. 20005. Single copies are $1. Prices differ for orders of 2,000 or more copies.

Plant Performance on Surface Coal Mine Spoil in Eastern United States

by the Soil Conservation Service

This report summarizes SCS evaluations of the adaptability of various plants to surface coal mine spoil in the Eastern United States.

Since 1946, SCS has assembled, evaluated, and screened many native and introduced species in an effort to find plants that adapt to conditions on mine spoil and provide erosion control.

Species that have widespread use or are best suited to special uses are discussed in the text. Information on special cultural and management practices required for a given species

or site condition is also given.

In the report, the eastern coal mining region is divided into 10 land resource areas. A map and descriptions of the elevation, climate, and soils of each area are given.

Following the text, all species tested in SCS plantings are listed in tables 1 through 5. The data in the tables are field observations from SCS plantings and plantings conducted cooperatively with State agencies and other Federal agencies. The text includes information from these plantings and from studies of plant performance in which SCS did not participate.

The tables give the performance of trees; shrubs, vines, and brambles; grasses; legumes; and forbs within land resource areas according to spoil groups, vigor, number of plantings, and age of planting. Spoil groups are listed as very acid (below pH 4.0), acid (pH 4.0 to 5.4), or slightly acid (pH 5.5 or above).

Sources cited in the text are listed in the Reference section at the back of the report. An index lists the scientific and common names for plants in the report and the page and table numbers where information about them can be found.

Single copies are available from local conservation district offices or from the Information Division, Soil Conservation Service, Room 0054–S, Washington, D.C. 20013.

Potential Cropland Study

by the Soil Conservation Service

This is a report of the study made by the Soil Conservation Service of the changes in the use of nonfederal lands in the United States between 1967 and 1975. It contains up-to-date statistical data at national and regional levels on the potential for converting land in other uses to cropland; the extent of land that can be readily converted; the problems related to developing the land for crop production, such as a seasonal high water table or a high erosion hazard; and land use changes and trends.

The study reports that of the lands converted to urban and other uses during the 8-year period, about 8 million acres were prime farmland. It also reports that the total acreage of cropland dropped from 431 million to 400 million acres. Declines occurred in most farm production regions, except in the Delta States region of Arkansas, Louisiana, and Mississippi and in the Mountain region, including Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming. About 111 million acres not now in crops have high or medium potential for conversion to cropland if needed. Only 34.9 million acres, however, can be converted without encountering soil erosion hazards or water disposal problems. Pastureland and rangeland acreage increased in every region.

The text and three appendixes include tables, graphs, and diagrams. Appendix 1 consists of five tables that are divided into 12 parts—one for the national summary, one each for the 10 U.S. farm production regions, and one for Hawaii, Alaska, and the Caribbean Area. Table 1 shows 1975 land use by capability class and subclass. Table 2 shows changes in land use between 1967 and 1975. Tables 3, 4, and 5 show 1975 data on the potential for conversion of land that is currently in pasture and range, forest, and other uses to cropland; the kind of development needed for the conversion; and the potential for conversion to cropland by capability class and subclass.

Appendix 2 describes the method used in the study for estimating coefficients of variation for the national acreage estimates. Appendix 3 has definitions of terms used in the study and explains the land capability classification system.

Single copies of "Potential Cropland Study" (Statistical Bulletin No. 578) are available from the Office of Governmental and Public Affairs, Room 502–A, USDA, Washington, D.C. 20250.

PLUARG Report:

A Guide to Improved Water Quality in the Great Lakes

In its final report to the United States and Canadian International Joint Commission (IJC), presented in Canada this summer, the Great Lakes Pollution from Land Use Activities Reference Group (PLUARG) suggested comparing point and nonpoint source alternatives for achieving cost-effective pollutant reductions.

According to the group's report, the Great Lakes are being polluted by runoff of phosphorus from some land uses, principally from agricultural and urban areas. PLUARG estimates that about 41 percent of the total phosphorus loads to the Great Lakes comes from nonpoint sources, mainly carried by fine-textured sediment.

PLUARG suggests stressing site-specific approaches to reducing phosphorus, sediment, and toxic substances entering the lakes.

PLUARG recommends that governments make better use of existing programs and agencies, such as soil and water conservation districts, to reduce pollutants reaching the Great Lakes. The group suggests that water quality management programs, such as 208 implementation in the U.S. portion of the basin, should be voluntary. Regulation should be used only when voluntary approaches do not result in reduced pollution.

A PLUARG survey of farmers in the Great Lakes area supports the voluntary approach. Some 56 percent of the Canadian farmers and 71 percent of the U.S. farmers surveyed said that the best policy for reducing water pollution is to rely solely on the voluntary cooperation of farmers. PLUARG suggests that all levels of government review the adequacy of their present voluntary programs first to determine if more specific guidelines or incentives may be needed.

Meetings:

November	
7–10	Future Farmers of America, Kansas City, Mo.
10–13	National Agricultural Plastics Association, Miami Beach, Fla.
12–15	National Association of State Universities and Land Grant Colleges, St. Louis, Mo.
12–15	National Forest Products Association, Palm Beach, Fla.
12–16	American Institute of Chemical Engineers, Miami, Fla.
13–17	National Conference on Urban Forestry, Washington, D.C.
13–20	The National Grange, Denver, Colo.
19–22	American Society of Landscape Architects, Atlanta, Ga.
29	No-Tillage Systems Conference, Griffin, Ga.
December	
3–6	American Society of Farm Managers and Rural Appraisers, Inc., New Orleans, La.
3–8	Joint Meeting of the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America, Chicago, Ill.
4–8	American Geophysical Union, San Francisco, Calif.
5–7	Western Forestry and Conservation Association, Sacramento, Calif.
6–8	Keep America Beautiful, Inc., Washington, D.C.
11–13	National Symposium on Strategies for Protection and Management of Floodplain Wetlands and Other Riparian Ecosystems, Atlanta, Ga.
January	
3–8	American Association for the Advancement of Science, Houston, Tex.
8–12	North American Game Breeders and Shooting Preserve Association, Kansas City, Mo.
9–11	National Council of Farmer Cooperatives, Las Vegas, Nev.
14–18	American Farm Bureau Federation, Miami Beach, Fla.
22–26	National Cattlemen's Association Convention and Trade Show, Houston, Tex.
28–31	National Wool Growers Association and National Lamb Feeders Association Joint Convention, Las Vegas, Nev.

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